CLAIM LISTING:

1. (Original) A method for recovery and purification of a gas used to enhance a medical process, which comprises:

a. passing said gas to said medical process and therein using said gas for enhancement of said process, use in said process also causing gaseous or liquid contaminants including water vapor, carbon dioxide, oxygen or nitrogen, to become incorporated into said gas;

b. collecting at least a portion of thus-contaminated gas;

c. determining which said gaseous or liquid contaminants are contained in said gas;

d. drying said contaminated gas to reduce said water concentration in said contaminated gas to not greater than 10 ppm, if said contaminated gas contains a water concentration;

e. contacting said contaminated gas with a carbon dioxide absorbent to reduce said carbon dioxide concentration to not greater than 10 ppm, if said contaminated gas contains a carbon dioxide concentration;

f. contacting said contaminated gas with an oxygen absorbent to reduce said oxygen concentration to not greater than 1 ppm, if said contaminated gas contains an oxygen concentration;

g. contacting said contaminated gas with a nitrogen getter to reduce said

nitrogen concentration to not greater than 1 ppm, if said contaminated gas contains a nitrogen concentration;

h. reducing other non-noble gaseous contaminants to not greater than 10 ppm, if said contaminated gas contains said other non-noble gaseous contaminants; and

i. collecting said gas after such decontamination for recycle to said medical process and subsequent reuse therein.

2. (Original) A method as in claim 1 wherein said gas is selected from a group consisting of an isotope of helium, xenon, carbon, fluorine and phosphorous.

3. (Original) A method as in claim 2 wherein said isotope of helium comprises He^3.

4. (Original) A method as in claim 2 wherein said isotope of xenon comprises Xe^{129}.

5. (Original) A method as in claim 2 wherein said isotope of carbon comprises C^{13}.

6. (Original) A method as in claim 2 wherein said isotope of fluorine comprises F^{19}.

7. (Original) A method as in claim 2 wherein said isotope of phosphorus comprises P^{31}.

8. (Original) A method as in claim 1 where said contaminant water

concentration in said contaminated gas is reduced to not greater than 100 ppb.

9. (Original) A method as in claim 8 where said contaminant water concentration in said contaminated gas is reduced to not greater than 10 ppb.

10. (Original) A method as in claim 1 where said carbon dioxide concentration in said contaminated gas is reduced to not greater than 100 ppb.

11. (Original) A method as in claim 10 where said contaminant water concentration in said contaminated gas is reduced to not greater than 10 ppb.

12. (Original) A method as in claim 1 where said oxygen concentration in said contaminated gas is reduced to not greater than 100 ppb.

13. (Original) A method as in claim 12 where said oxygen concentration in said contaminated gas is reduced to not greater than 10 ppb.

14. (Original) A method as in claim 1 wherein said other non-noble gaseous contaminants are selected from a group consisting of hydrogen, a hydrocarbon, a nitrogen oxide and ozone.

15. (Original) A method as in claim 1 further comprising hyperpolarizing said gas prior to passage of said gas to said medical process.

16. (Original) A method as in claim 15 wherein said gas prior to said hyperpolarization is under superatmospheric pressure.

17. (Original) A method as in claim 16 wherein said medical procedure in

which hyperpolarized gas is used comprises medical imaging.

18. (Original) A method as in claim 17 wherein said medical imaging procedure in which hyperpolarized gas is used comprises magnetic resonance imaging.

19. (Original) A method as in claim 18 wherein said gas is selected from the group consisting of helium and xenon isotopes.

20. (Original) A method as in claim 19 wherein said isotope of helium comprises He^3.

21. (Original) A method as in claim 19 wherein said isotope of xenon comprises Xe^{129}.

22. (Original) A method as in claim 15 wherein following hyperpolarization said gas is collected in a first gas-tight container from which said gas is inhaled by said patient during said medical imaging process, and following medical imaging of said patient said gas is subsequently exhaled by said patient into second gas-tight container, said gas exhaled being contaminated with respiratory gases and vapors simultaneously exhaled by said patient, following which said contaminated gas in said second container is withdrawn from said second container under subatnospheric pressure and passed for decontamination in steps d-h.

23. (Original) A method as in claim 22 further comprising, prior to said decontamination, compressing thus-decontaminated gas and purifying and storing said decontaminated gas under superatmospheric pressure for said recycle and reuse.

24. (Original) A method as in claim 22 further comprising, following said

decontamination, compressing thus-decontaminated gas and storing said decontaminated gas under superatmospheric pressure for said recycle and reuse.

25. (Original) A method as in claim 22 wherein residual gas in said first container not inhaled by said patient is withdrawn from said first container under substmospheric pressure and also passed for decontamination in steps d-h.

26. (Original) A method as in claim 25 further comprising, prior to said decontamination, compressing thus-decontaminated gas and purifying and storing said decontaminated gas under superatmospheric pressure for said recycle and reuse.

27. (Original) A method as in claim 25 further comprising, following said decontamination, compressing thus-decontaminated gas and storing said decontaminated gas under superatmospheric pressure for said recycle and reuse.

28. (Original) A method as in claim 1 wherein said gas passed in step a. to said medical process comprises a mixture of a first quantity of said decontaminated gas which has been used at least once in a prior such medical process and a second quantity of fresh said gas which has not previously been used in said medical process.

29. (Original) A method as in claim 15 wherein said hyperpolarized gas passed in step a. to said medical imaging comprises a mixture of a first quantity of said decontaminated gas which has been used at least once in prior such medical imaging and a second quantity of fresh said gas which has not previously been used in said medical imaging.

30. (Original) A method as in claim 1 wherein at least one of the steps therein is controlled by a microprocessor.

31. (Original) A method as in claim 15 wherein at least one of the steps therein is controlled by a microprocessor.

32. (Original) A method as in claim 1 further comprising filtering said contaminated gas through a filter to extract biological materials from said gas.

33. (Original) A method as in claim 32 wherein said filter has a biological filtration capability in the range of 1-10 nm.

34. (Original) A method as in claim 33 wherein said filter has a biological filtration capability on the order of 3 nm.

35. (Original) A method as in claim 1 wherein following decontamination of said gas in steps d-h, a process unit in which said decontamination has been conducted is isolated and regenerated for future decontamination, and thereafter said isolation of said unit is terminated and said unit as regenerated is made available for use in said method.

36. (Original) A method as in claim 35 wherein said isolation is by removal of said unit from incorporation in a decontamination process which performs said method, followed after regeneration by return to availability by reincorporation into said process.

37. (Original) A method as in claim 35 wherein said isolation is by bypassing of said unit in a decontamination process which performs said method, followed after regeneration by return to availability by such bypassing being terminated.

38. (Original) A method as in claim 35 wherein said process unit conducts said drying of step d.

39. (Original) A method as in claim 35 wherein said process unit conducts said contacting with a carbon dioxide absorbent of step e.

40. (Original) A method as in claim 35 wherein said process unit conducts said contacting with an oxygen absorbent of step f.

41. (Original) A method as in claim 35 wherein said process unit conducts said contacting with a nitrogen getter of step g.

42. (Original) A method as in claim 35 wherein said process unit conducts said reducing of step h.

43. (New) A method for recycling a chosen gas used in a medical procedure, comprising:

a) retrieving a gas mixture from a first patient, wherein said gas mixture includes said chosen gas;

b) inserting said gas mixture into a recycling device;

c) passing the gas mixture through a dryer unit to remove water vapor from the gas mixture;

d) passing the gas mixture through a getter to remove non-chosen gasses in the gas mixture, wherein only the chosen gas remains;

e) storing the chosen gas for later use;

f) removing the chosen gas from storage;

g) transferring the chosen gas to a cell, wherein it is prepared for delivery to a second patient; and

h) supplying the gas prepared in step g) to said second patient.

44. (New) The method of claim 43, wherein said medical procedure is diagnostic MRI; said chosen gas is a noble gas; and wherein, after recovery, said noble gas is prepared for delivery to said second patient in step g) by putting it in a hyperpolarized state.

45. (New) The method of claim 43, wherein said chosen gas is selected from the group consisting of: an isotope of Xe; an isotope of He; ^{31}P; ^{13}C; ^{23}Na; and ^{19}F.

46. (New) A device for recycling a chosen gas, comprising:

a) a first portable container (102) connected to a first end of a first gas line;

b) a vacuum pump (106), connected to the second end of said first gas line;

c) a getter (112), connected to said vacuum pump:

d) a storage container (118), connected to said getter and to a first end of a second gas line;

e) a mass flow controller (120) for regulating the amount of said gas that flows from said storage container and which is connected to the second end of said second gas line;

f) a purifier (122) connected to said mass flow controller;

g) a cell (126) for preparing said gas for delivery to a patient and connected to said purifier; and

h) a second portable container (124) for receiving hvperpolarized noble gas from said cell.

47. (New) The device of claim 46, wherein said gas is prepared for delivery to a patient in step g) by putting said gas into a hvperpolarized state.

48. (New) The device of claim 46, further comprising:

a) a dryer (108) connected to said vacuum pump; and

b) a second purifier (110) connected to said dryer (108) and to said getter (112).

49. (New) The device of claim 48, further comprising a sanitizer (131) for sterilizing gas, said sanitizer being connected to said getter (112) and to said storage tank (118).

50. (New) The device of claim 49, further comprising a compressor (116) connected to said getter (116) and to said storage tank.

51. (New) The device of claim 50, further comprising:

a) a surge tank (104) connected to said first portable container (102) and to said vacuum pump (106): and

b) a valve (114) for introducing additional noble gas into said storage tank (118), said valve being connected to said sanitizer (131) and to said compressor (116).

52. (New) The device of claim 51, further comprising a second storage tank (130) that may be used to mix additional gasses with said noble gas prior to hvperpolarization, said second storage tank being connected to said purifier (122) and to said mass flow controller (120).

53. (New) A method of recycling a chosen gas comprising introducing an impure mixture of said chosen gas into the device of any one of claims 46-52.

54. (New) The method of claim 53, wherein said chosen gas is a noble gas.

55. (New) The method of claim 53, wherein said chosen gas is selected from the group consisting of: an isotope of Xe; an isotope of He; ^{31}P; ^{13}C; ^{23}Na; and ^{19}F.

56. (New) An MRI imaging machine comprising a device for recycling a chosen gas comprising:

a) means for recycling a mixture of gases containing said chosen gas and introducing said mixture of gases into said device;

b) means for propelling the gases introduced in step a) through said device;

c) means for purifying chosen gas as it is propelled through said device;

d) means for storing chosen gas purified by the means of step c);

e) means for removing chosen gas from the storage means of step d) and for regulating the amount of gas that flows from said storage means;

f) means for transforming gas that has been removed from the storage means of step d) into a state for delivery to a patient; and

g) means for transferring the gas prepared in step f) out of said device.

57. (New) The MRI machine of claim 56, wherein said chosen gas is a noble gas that is transformed into a state for delivery to a patient by putting it into a hyperpolarized state.

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